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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,050	08/30/2001	Rand David Dannenberg	M00A226	8351

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PARSONS HSUE & DE RUNTZ LLP
655 MONTGOMERY STREET
SUITE 1800
SAN FRANCISCO, CA 94111

EXAMINER	
CHANG, AUDREY Y	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 03/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

A/c

Office Action Summary	Application No.	Applicant(s)	
	09/944,050	DANNENBERG, RAND DAVID	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 17 December 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 7-15 and 22-52 is/are pending in the application.

4a) Of the above claim(s) 7-15 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 22-52 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on December 17, 2004, which has been entered into the file.
- By this amendment, the applicant has canceled claims 1-6, and 16-21 and has newly added claims 22-52.
- Claims 7-15 are **withdrawn** from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention group and species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 8.
- Claims 22-52 remain pending in this application.

Claim Objections

1. **Claims 32-34, 36 and 39-52 are objected to because of the following informalities:**

(1). Claims 32-34 and 36 each recites either an "underlying layer" and/or an "overlying layer" that are confusing and indefinite since it is really not clear what are these underlying and overlying layers and how are they related to other layers in the optical coating.

(2). The phrase "over a substrate" recited in claim 39 is confusing and indefinite since it is not clear if this substrate is the same or not with respect to the "substrate" recited in the preamble of the claim. Claims 40-52 inherit the objection from their based claim.

(3). Claim 49 it is confusing and indefinite since it is not clear if the whole optical coating with the substrate is heat treated or *just* the substrate is heat treated. It is not possible to just heating the substrate to heat-treat the substrate alone since the optical coating have already been coated on the substrate. Clarification is required.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 22-27, 28-38 and 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Hartig et al (PN. 5,344,718) in view of the patent issued to Hirai et al (PN. 6,115,180).**

Hartig et al teaches a low-e *coated articles* and *method* for making the same wherein the coated articles comprises a *substrate* (G, Figure 4) and a *coating on the substrate*, (please see Figure 4, and column 8). The *coating* further comprises a *first dielectric layer* (211), a *metallic layer* (215) over the first dielectric layer and a *second dielectric layer* (221), over the metallic layer. With regard to claim 24, Hartig et al teaches that the *metallic* layer is *silver*. With regard to claims 25-27, Hartig et al further teaches to include *nickel-chromium* layer (213 and 219) as the *barrier layers* interposed between the first dielectric layer and the metallic layer and between the metallic layer and the second dielectric layer. The method steps concerning depositing these layers as claimed in claim 39 are met by the disclosure of this layer structure implicitly.

Hartig et al teaches that the first and second dielectric layer could be made of dielectric material such as silicon nitride but it does not teach explicitly that the dielectric layer is made by the *amorphous* titanium oxide with *additive* in an oxidization state as claimed. **Hirai et al** in the *same field of endeavor* teaches an optical *multilayered film coating* that is comprised of dielectric layers made of *amorphous titanium oxide with additive of silicon oxide*, (please see Figure 3 and column 7, line 25-40). Hirai et al teaches explicitly that with different percentage amount of silicon dioxide additive to the amorphous

titanium dioxide, different refractive indices for the dielectric layer thin film may be achieved. One skilled in the art would recognize immediately that the refractive index of the thin film layer is a crucial factor for determining the optical characteristics (i.e. reflection, transmission and antireflection properties) of the thin film layer. These explicit teachings of the composite layer constitutions with different refractive indices as indicated in Figure 3 would benefit one skilled in the art to select the desired composite film as the dielectric layer to achieve the desired optical properties for the optical coating. Hirai et al further teaches that the silicon dioxide-titanium dioxide composite film has the advantage of no polarization dependency, which makes the thin film layer polarization-independent. It would then have been obvious to one skilled in the art to apply the teachings of Hirai et al to use the amorphous titanium oxide with additive of silicon oxide as the dielectric layers for the benefit of making the low-e coated article with desired optical properties (including transmission, reflection and antireflection properties) and making the low-e coated article being polarization independent. Although these references do not identify the dielectric layers as "anti-reflection layers" the anti-reflection property is *implicitly* included in the layer material, (one skilled in the art would know the antireflection property is determined by the *refractive index* and *layer thickness* of the dielectric layer) and it is well known in the art to design the low-e coating with metallic layer interposed between *two antireflection layers* for the benefit of reducing unwanted reflection. It would then have been obvious to one skilled in the art to make the dielectric layers antireflective layers for the benefit of reducing unwanted reflection from the coated article.

With regard to claims 28-32, the cited references do not teach explicitly about the cited properties of the amorphous material are *substantially* the same at a heat-treatment temperature of the substrate, however such features are implicitly included, since Hartig et al in combination with Hirai et al references teach a **final** product of the optical coating comprising the amorphous material with a set amorphism, refractive index, and size. The product-by-process limitations concerning the amorphous material at a temperature treatment temperature, (which is an arbitrary temperature) of the substrate, are given no

patentable weight since the process, the temperature treatment of the substrate, does not distinguish the **final product** which is the optical coating comprising the amorphous material, from the optical coating of the instant application.

With regard to claims 33-34 and 36, the features concerning the amorphous material is **sufficient** to reduce atmospheric oxidation of an underlying layer and/or **sufficient** to reduce contaminant migration to an overlying layer are considered to be implicitly met by the property of the amorphous materials disclosed by Hirai et al, otherwise the amorphous material will not be stable enough to be used as a layer material in a multilayer coating structure, which certainly include underlying and overlying layer.

With regard to claim 35, the feature concerning the amorphous material is **sufficient** to reduce haze, and with regard to claim 37, the feature concerning the crystallization temperature are implicitly met by the amorphous material of Hirai et al since they are **implicitly** properties of the amorphous material, (since the instant application and the cited Hirai et al reference both discloses the same amorphous material with the same additive, such inherent property should be implicitly met).

With regard claim 38, Hirai et al teaches explicitly that the amorphous titanium oxide with silicon oxide additive can have refractive index of 2.1, (please see Figure 3).

With regard to claims 40-42, Hartig et al teaches that the layers are deposited by *sputtering* coat process, (please see column 1, lines 5-10). However it does not teach explicitly that it is done in an oxygen environment. **Hirai** et al teaches that the amorphous titanium oxide with silicon dioxide additive layer material in the multilayer structure is formed by sputtering process in *oxygen environment* with titanium oxide and the additive (i.e. silica) as the target, (please see column 7 lines 5-24). It would then have been obvious to one skilled in the art to apply the teachings of Hirai et al to modify the deposition method of Hartig et al for the benefit of manufacturing the coated article using sputtering process with sufficient oxygen content to form the desired amorphous **oxide** layer. Although it does not teach that the

titanium and the additive as separate target such modification would have been obvious to one skilled in the art for the benefit of having a control of the sputtering process for the two materials separately.

With regard to claim 43, Hirai et al teaches that the additive is silicon oxide, as explicitly discussed in paragraphs above.

4. Claims 39, and 49-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Lingle et al (PN. 6,514,620) in view of the patent issued to Hirai et al.

Lingle et al teaches a low-e matchable *coated articles* and *method* for making the same wherein the coated articles comprises a *substrate* (1) and a *coating on the substrate*, (please see Figure 1). The *coating* further comprises a *first dielectric laye*r (3), a *metallic layer* (7) over the first dielectric layer and a *second dielectric layer* (11), over the metallic layer. The method steps concerning depositing these layers as claimed in claim 39 are met by the disclosure of this layer structure implicitly.

Lingle et al teaches that the first and second dielectric layer could be made of dielectric material such as silicon nitride but it does not teach explicitly that the dielectric layer is made by the *amorphous* titanium oxide with *additive* in an oxidization state as claimed. **Hirai et al** in the same field of endeavor teaches an optical *multilayered* film *coating* that is comprised of dielectric layers made of *amorphous titanium oxide with additive of silicon oxide*, (please see Figure 3 and column 7, line 25-40). Hirai et al teaches explicitly that with different percentage amount of silicon dioxide additive to the amorphous titanium dioxide, *different* refractive indices for the dielectric layer thin film may be achieved. One skilled in the art would recognize immediately that the refractive index of the thin film layer is a crucial factor for determining the optical characteristics (i.e. reflection, transmission and antireflection properties) of the thin film layer. These explicit teachings of the composite layer constitutions with different refractive indices as indicated in Figure 3 would benefit one skilled in the art to select the desired composite film for the particular need and design. **Hirai** et al further teaches that the silicon dioxide-

titanium dioxide composite film has the advantage of with no polarization dependency, which makes the thin film layer polarization-independent. It would then have been obvious to one skilled in the art to apply the teachings of Hirai et al to use the amorphous titanium oxide with additive of silicon oxide as the *dielectric layers* for the benefit of making the low-e coated article with desired optical properties (including transmission, reflection and antireflection properties) and making the low-e coated article being polarization independent. Although these references do not identify the dielectric layers as "anti-reflection layers" the anti-reflection property is *implicitly* included in the layer material, (one skilled in the art would know the antireflection property is determined by the *refractive index* and *layer thickness* of the dielectric layer) and it is well known in the art to design the low-e coating with metallic layer interposed between two antireflection layers for the benefit of reducing unwanted reflection. It would then have been obvious to one skilled in the art to make the dielectric layers antireflective layers for the benefit of reducing unwanted reflection from the coated article.

With claim 49-52, Lingle et al teaches that the coated article, including the substrate, is heat-treated with temperature (about 500 Celsius) which is implicitly above the heat treatment of the substrate (normally about 150-200 Celsius) alone, (please see column 7). Lingle et al teaches that the heat treatment is done through the substrate in monolithic manner wherein this heat treatment may include tempering, bending and heat strengthening, (and the temperatures for these treatment are included), (please see column 7). Although this reference does not teach about the heat treatment temperature is below a crystallization temperature of the amorphous material such modification would have been within the general skill of a worker in the art for the purpose of making the amorphous material not to crystallize and therefore lose the amorphism.

5. **Claims 44-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Lingle and Hirai et al as applied to claim 39 above, and further in view of the article**

"Single-and dual-ion-beam sputter deposition of titanium oxide film" by Hsu et al (Applied Optics Vol. 37, No. 7 pages 1171-1176).

The method for coating a low-e optical coating on a substrate taught by **Lingle** et al in view of the teachings of Hirai et al as described for claim 39 above have met all the limitations of the claims. These references however do not teach explicitly that the amorphous titanium oxide is deposited at a low temperature and high deposition rate. **Hsu** et al in the same field of endeavor teaches a sputtering disposition process for forming titanium oxides film wherein Hsu et al teaches **explicitly** that when the titanium oxide deposited at *room temperature* (about 25^0 Celsius) the resultant film is always amorphous, (please see page 1171 and column 2, first paragraph). Hsu et al also teaches that sputtering rate of deposition is high. Although this reference does not teach explicitly that the rate is above 5 angstroms per second, however such rate is within common rage of deposition rate, (normally 1 angstroms to 20 angstroms per second). It would then have been obvious to one skilled in the art to apply the teachings of Hsu et al to deposit the amorphous titanium oxide layer at room temperature for the benefit of ensuring the amorphous phase of the titanium oxide film.

Response to Arguments

6. Applicant's arguments filed December 17, 2004 have been fully considered but they are not persuasive. The newly submitted claims have been fully considered and they are rejected for the reasons stated above.

In response to applicant's arguments which states that the cited Hirai et al reference "does not pertain to the field of applicant's endeavor and is not reasonably pertinent to the particular problem with which applicant was involved which therefore is non-analogous art", the examiner respectfully disagrees for the reasons stated below. **Firstly**, applicant has identified that his endeavor is in the area of "optical coatings for a substrates", (please see page 9 of the remark). Hirai et al *also* teaches an optical coating for

a substrate. The optical filter (i.e. the multilayer structure of Hirai et al) is a *form* of optical coating and the optical coating is always on a substrate. The claims are mainly drawn to "optical coating on a substrate" no particular "problems" are identified **in the claims** that differentiate the "field of endeavor" of the instant application from the cited prior art. **Secondly**, the claims of the instant application are mainly drawn to optical coating on a substrate, the features concerning the heat treatment of the substrate is not included in most of the claims, (claims 22-31, and 33-48) and the heat treatment of the substrate which is a *process* limitations that does not differentiate the final product and therefore is not given any patentable weight for the article claims concerning the optical coating on the substrate in claims 22-38. **Thirdly**, the cited Hirai et al reference is relied to provide the teachings that an amorphous titanium oxide film with silicon additive is a suitable dielectric layer for forming optical coating. Such crucial teachings will motivate and allow **one skilled in art to** use this material to design optical coating, either of single layer or multilayer structure, to have desired optical properties. The cited Hirai et al reference therefore is within the field of endeavor of the instant application.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.